

Data Processing Circuits

Decoders

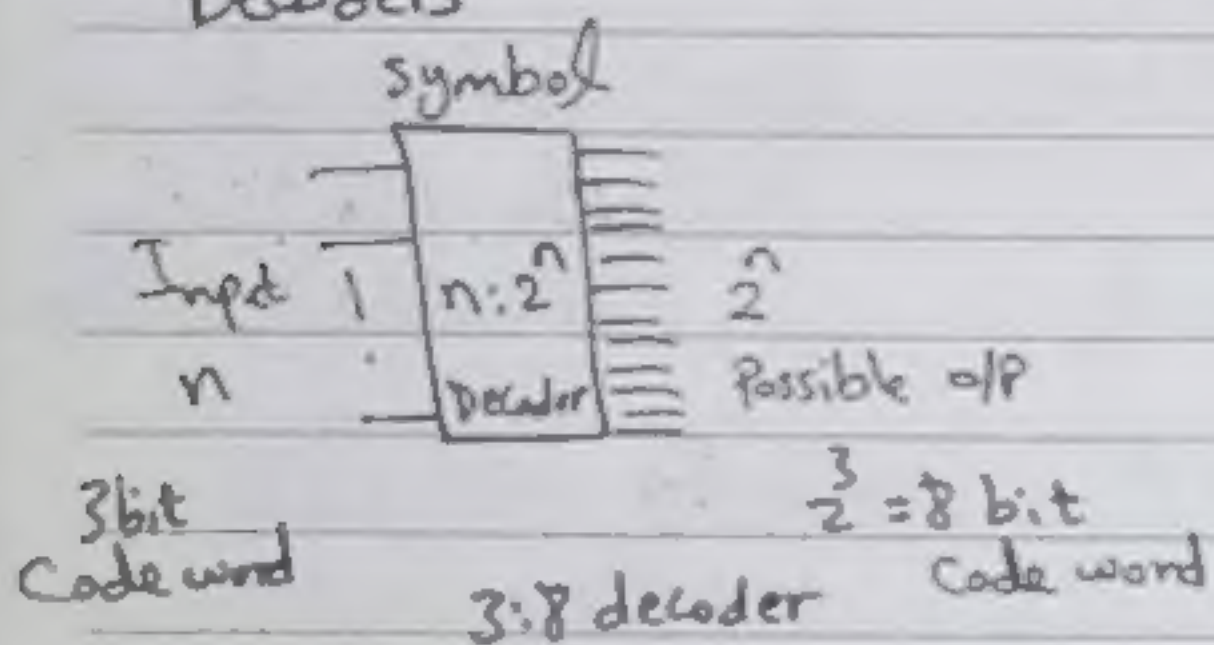
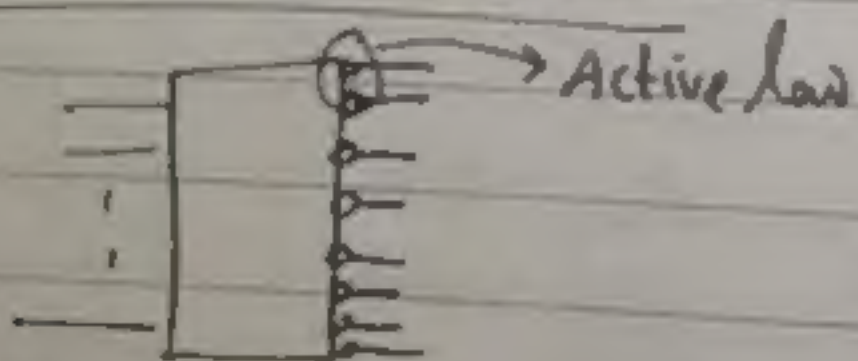


Table F of decoder:- "Active high decoder"

A	B	C	D_0	D_1	D_2	D_3	D_4	D_5	D_6	D_7
0	0	0	1	0	0	0	0	0	0	0
0	0	1	0	1	0	0	0	0	0	0
0	1	0	0	0	1	0	0	0	0	0
0	1	1	0	0	0	1	0	0	0	0
1	0	0	0	0	0	0	1	0	0	0
1	0	1	0	0	0	0	0	1	0	0
1	1	0	0	0	0	0	0	0	1	0
1	1	1	0	0	0	0	0	0	0	1

Active high decoder → output \oplus minterm of input.
 D_0 corresponding to "minterm" $\bar{A}\bar{B}\bar{C}$.

* Symbol of Active low:-



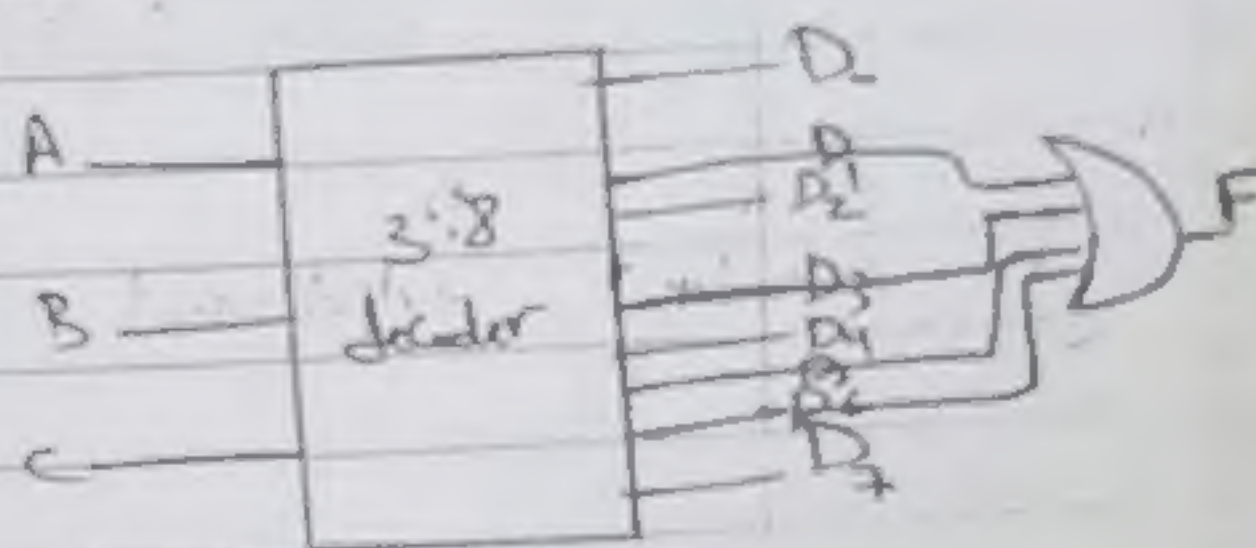
* Realization of Multiple output function using decoder :-

Active high output 74138

$$* F = \sum m(1, 3, 5, 6)$$

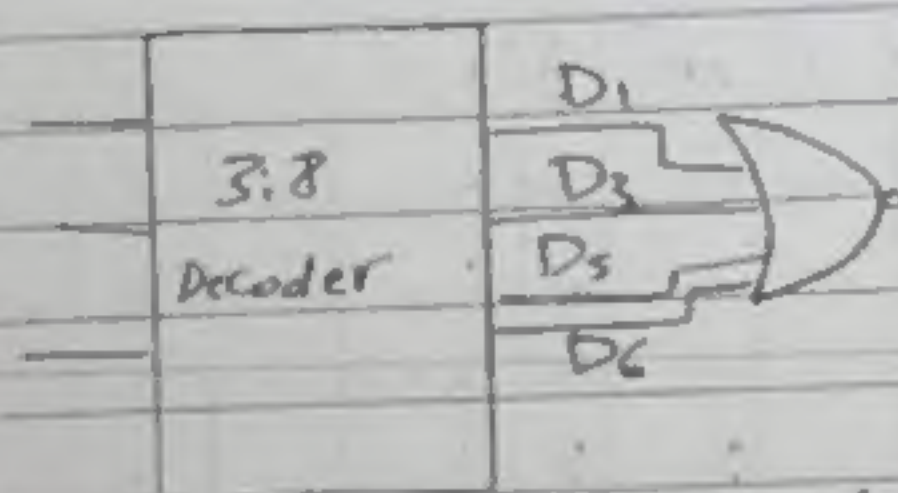
$$= \bar{A}\bar{B}C + \bar{A}BC + A\bar{B}C + AB\bar{C}$$

$$= m_1 + m_3 + m_5 + m_6$$



$$* F = \prod M(0, 2, 4, 7)$$

$$= (\bar{A} + \bar{B} + C) \cdot (\bar{A} + B + \bar{C}) \cdot (A + \bar{B} + \bar{C}) \cdot (A + B + C) = M_0 M_2 M_4 M_7$$



$$F = (m_1 + m_3 + m_5 + m_6)$$

$$= \bar{m}_1 \cdot \bar{m}_3 \cdot \bar{m}_5 \cdot \bar{m}_6$$

$$= M_1 M_3 M_5 M_6$$

Active low decoder

$$* F = \sum m(1, 3, 5, 6)$$

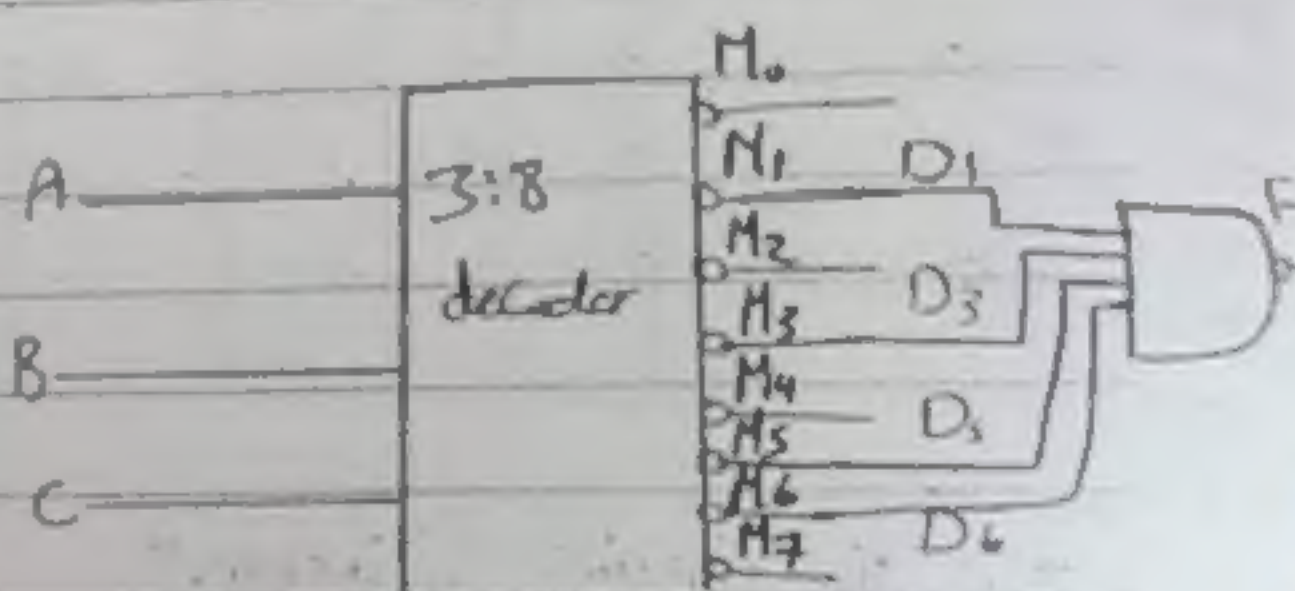
$$\hookrightarrow = \prod M(0, 2, 4, 7)$$

$$(\bar{M}_1 M_3 M_5 M_6) =$$

$$\bar{M}_1 + \bar{M}_3 + \bar{M}_5 + \bar{M}_6$$

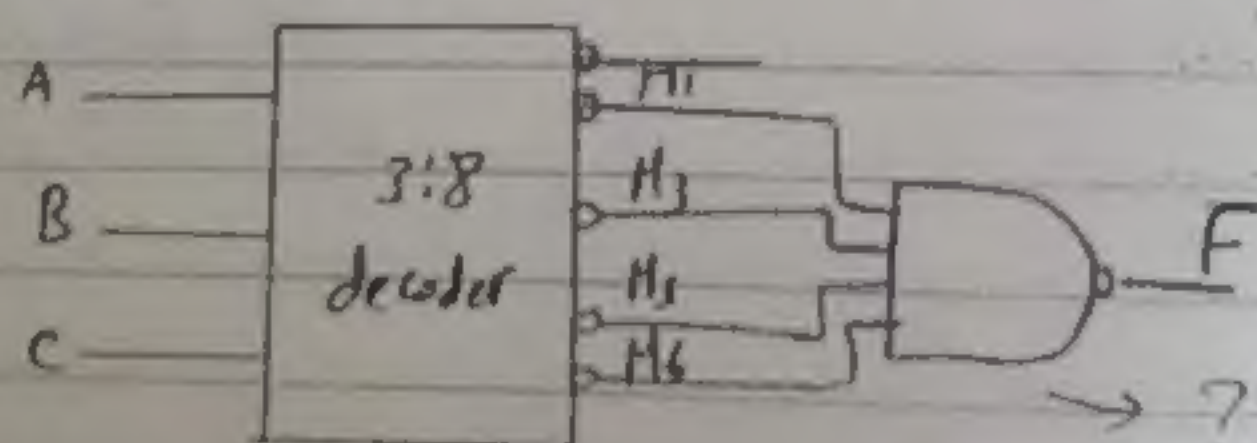
$$= m_1 + m_3 + m_5 + m_6$$

$$\bar{F} = \sum m(0, 2, 4, 7)$$



?? OR

$$* F = \prod M(1, 3, 5, 6)$$

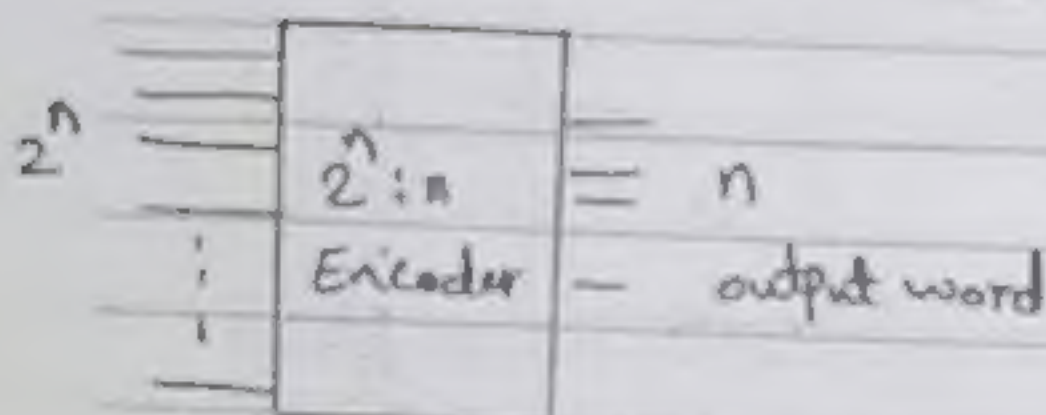


→ ?? AND?

0 → 9

* BCD (Binary Coded Decimal) to 7-segment

* Encoder :- Multiple i/p, Multiple o/p Combined into a single logic circuit.



* Octal to Binary Encoder & 8x3 Encoder
"code word of length 8" to "code word of length 3"

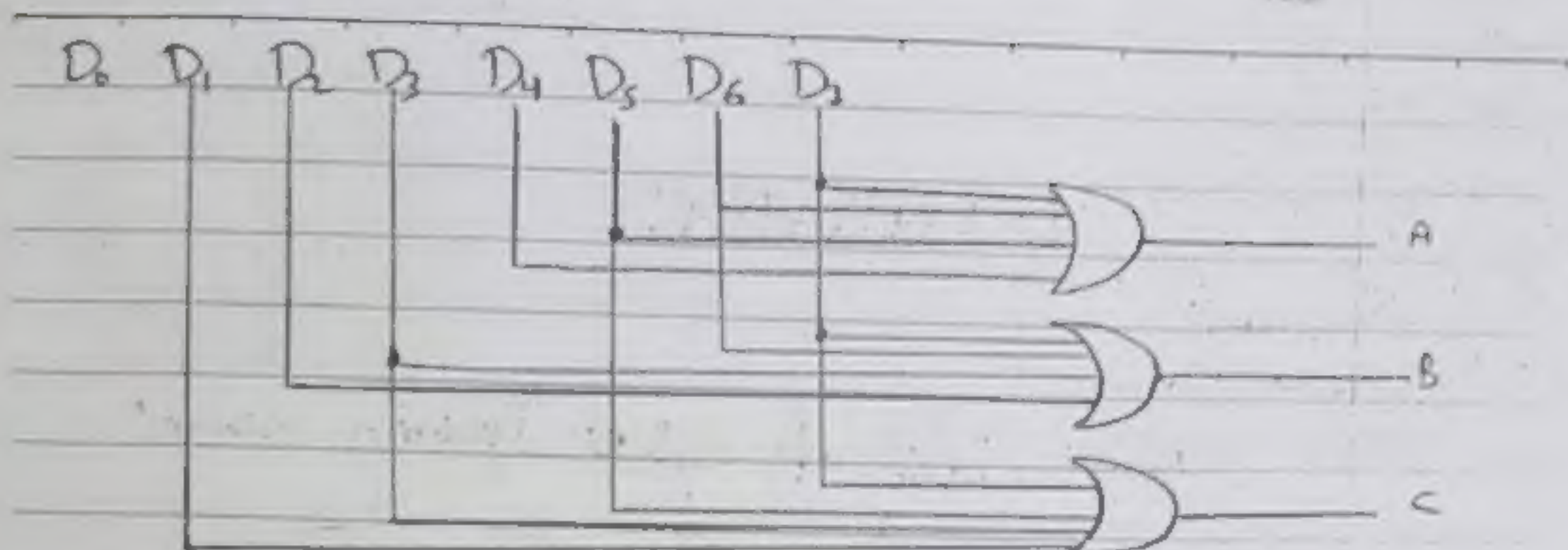
D_0	D_1	D_2	D_3	D_4	D_5	D_6	D_7	A	B	C
1	0	0	0	0	0	0	0	0	0	0
0	1	0	0	0	0	0	0	0	0	1
0	0	1	0	0	0	0	0	0	1	0
0	0	0	1	0	0	0	0	0	1	1
0	0	0	0	1	0	0	0	1	0	0
0	0	0	0	0	1	0	0	1	0	1
0	0	0	0	0	0	1	0	1	1	0
0	0	0	0	0	0	0	1	1	1	1

* Logic Circuit "Diagram"

$$A = D_4 + D_5 + D_6 + D_7$$

$$B = D_2 + D_3 + D_6 + D_7$$

$$C = D_1 + D_3 + D_5 + D_7$$



* حسب قيمة الإدخال D_0 غير معرفة، الناتج يكون $\bar{A}\bar{B}\bar{C}$ (undetermined output)
 * لو آلة من رام داخل الخرج "فلا" Priority encoder

* Priority encoder * is a practical form of an encoder
 (4bit Priority encoder)

input				output		
D_0	D_1	D_2	D_3	A	B	V
0	0	0	0	X	X	0
1	0	0	0	0	0	1
X	1	0	0	0	1	1
X	X	1	0	1	0	1
X	X	X	1	1	1	1

* 8 bit
 8 bits

$D_0 D_1$ \ $D_2 D_3$	00	01	11	10
00	0	1	1	1
01	0	1	1	1
11	0	1	1	1
10	0	1	1	1

$$A = D_2 + D_3$$

$$B = D_3 + D_1 \bar{D}_2$$

$D_0 D_1$ \ $D_2 D_3$	00	01	11	10
00	0	1	1	1
01	0	1	1	1
11	0	1	1	1
10	0	1	1	1

$D_2 D_3$	$D_1 D_0$			
	00	01	11	10
00	0	1	1	1
01	1	1	1	1
11	1	1	1	1
10	1	1	1	1

$$V = D_2 + D_3 + D_1 + D_0$$

* Logic Circuit of A, B, C "Priority Encoder"

